Year 12 Topics

In year 12 we teach the following topics over the course of the year. Each topic draws on prior learning from previous years and builds on understanding from the KS4 programme of study. Each topic develops and deepens the Core knowledge that will underpin all areas of the curriculum at KS5 and onward into undergraduate courses.

Learning Aim A				
Topic	Rationale	Knowledge acquisition	Key vocabulary	Skills and enrichment
A1 Relational database management systems	Students will learn about the types of relational database management systems (RDBMS) and their characteristics. They will investigate RDBMS based on relational models.	relational data structures	RDBMS, relation, attribute, domain, tuple, cardinality, relational database	independence, problem solving, evaluation analysis, creativity literacy numeracy oracy Access skills creating tables Creating forms Creating queries Creating reports Creating relationships
		relational algebra sets	symbols, union, intersect, join, select.	
		database relations	entity relationship, generic, semantic	
		relational keys	super key, candidate key, primary key, foreign key	
		integrity constraints	entity integrity, referential integrity	
		entity relationships	one-to-one, one-to-many, many-to-many.	
A2 Manipulating data structures and data in relational databases	Students will learn to use of RDBMS software tools and structured query language (SQL) for defining, modifying and removing data structures and data.	updating, inserting, deletion	SQL Structured Query Language, updating, inserting, deletion	independence, problem solving, evaluation analysis, creativity literacy numeracy oracy Access skills SQL in Access Queries in Access
		retrieval of data for queries, reports	retrieval	
		administration of users	administration	
		security, integrity, recovery.	security, integrity, recovery.	

Topic	Rationale	Knowledge acquisition	Key vocabulary	Skills and enrichment
A3 Normalisation	Students will learn the role of normalisation to develop efficient data structures.	anomalies – update, insertion, deletion	anomalies	independence, problem solving, evaluation analysis, creativity literacy numeracy oracy normalisation Access skills Data types Field lengths Validation in a table
		primary keys, foreign keys, composite keys	composite keys	
		Indexing, referential integrity	indexing referential integrity	
		data dictionary	tables, fields, data types, validation	
		cascading update deletion techniques joins, unions, intersects	cascading update deletion techniques joins, unions, intersects	
		stages of normalisation: - un-normalised form (UNF) - first normal form (1NF) - second normal form (2NF) - third normal form (3NF).	Normalisation, un-normalised form (UNF), first normal form (1NF), second normal form (2NF), third normal form (3NF).	
Learning Aim B				
B1 Relational database design	Students will learn about the selection of RDBMS and SQL software, tools, techniques and processes.	Database design: conceptual, logical and physical modelling and entity relationship modelling.	conceptual, logical and physical modelling, entity relationship modelling	independence, problem solving, evaluation analysis, creativity literacy numeracy oracy normalisation entity relationship diagram Access skills Complex queries
		Relational algebra: one to many, one to one, many to many, AND, OR, NOT, >, <, ≥, ≤	AND, OR, NOT	
		RDMS and SQL software selection.		
		Application design: user interface, software applications.	user interface	
		Database implementation techniques: prototyping, data conversion, testing.	prototyping, data conversion	
		Quality, effectiveness and appropriateness of the solution: correctness of data relationships between data, data integrity, normalisation.		

Topic	Rationale	Knowledge acquisition	Key vocabulary	Skills and enrichment
B2 Design documentation	Students will learn about the features and characteristics of relational database design techniques and their application to solve problems.	requirements of the brief	audience, purpose and client's requirements	independence, problem solving, evaluation analysis, creativity literacy numeracy oracy Access skills Advanced form skills verification validation calculated fields masks directed input Advanced report skills Report calculations Advanced query skills queries using multiple criteria, form values, wild cards, action queries, calculated queries Test plans
		security and legal considerations: • Data Protection Act 1998 • The European Union (EU) Directive on Data Protection (legislation must be current • and applicable to England, Wales, Northern Ireland)	GDPR, Data Protection Act 1998, The European Union (EU) Directive on Data Protection	
		data structure designs: • data dictionaries and their use: tables, field attributes, validation • use of naming conventions • entity relationship diagrams • normalisation	naming conventions	
		user interface design: • data entry/input – verification, validation, calculated fields, masks, directed input • reports – fields, queries, presentation of data, calculations • task automation – imports, updates, deletions	verification, validation, calculated fields, masks, directed input	
		extracting and presenting data: • queries using multiple criteria, form values and wild cards • action queries • calculated queries • reports	multiple criteria, wild cards, action queries, calculated queries	
		design and use of test plans: to check correctness of data, functionality, accessibility, usability.		

Learning Aim C				
Topic	Rationale	Knowledge acquisition	Key vocabulary	Skills and enrichment
C1 Producing a database solution	Students will learn to select and configure appropriate RDBMS and SQL tools to produce a database solution to meet client's requirements:	creating, setting up and maintaining data tables	naming conventions verification, validation, calculated fields, masks, directed input multiple criteria, wild cards, action queries, calculated queries	independence, problem solving, evaluation analysis, creativity literacy numeracy oracy All Access skills
		creating links, relationships between data tables		
		applying data validation rules		
		generating outputs – user-generated queries, automated queries, reports		
		user interface – navigation, data-entry forms, sub-forms		
		automated functions		
		populating the database: • importing • adding data • manipulating data		
		devising and using SQL statements to extract, manipulate and modify data		
		applying security measures to control access to data: passwords, user access levels.		
C2 Testing and refining the database solution		Different types of testing: referential integrity, functionality, security.	referential integrity, functionality, security	independence, problem solving, evaluation analysis, creativity literacy numeracy oracy Test Documentation
		Selection and use of appropriate test data: erroneous data, extreme data.	appropriate test data: erroneous data, extreme data	
		Recording appropriate test documentation.		
		Using testing outcomes to improve and refine a database solution.		

Learning Aim D				
Topic	Rationale	Knowledge acquisition	Key vocabulary	Skills and enrichment
D1 Database design evaluation	Students learn about evaluating a design against the given requirements.	use and application of an entity-relationship diagram, data dictionary, normalisation		
		coverage of functionality requirements and identification of any omissions		
		identification of design strengths and potential further improvements to meet given requirements.		
D2 Evaluation of database testing	Students learn about evaluating the application of test data to ensure that the database solution meets requirements.	• Different types of testing: o normal test data o erroneous test data o extreme test data.	appropriate test data: erroneous data, extreme data	
		Recording of actual results and analysis.		
		Commenting on results. • taking of and storing screenshots of tests.		
		Test records: • completion of test records		
		Making use of testing outcomes.		
		Using iterative processes to improve accuracy, readability and robustness.		
		Identifying and recording which tests were successfully met and which test data issues were not resolved.		
D3 Evaluation of the database	Students learn about evaluating the software outcome against the given requirements.	Strengths and weaknesses of the database: o solution fitness for purpose o intuitiveness and ease of use o constraints of the database software used o maintainability of the database o extent to which database meets the given requirements.	fitness for purpose, intuitiveness, constraints	